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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,626	10/29/2003	Bala Ramachandran	03SKY0003	5553

24504 7590 11/14/2008
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WONG, LINDA	
ART UNIT	**PAPER NUMBER**
2611	
MAIL DATE	**DELIVERY MODE**
11/14/2008	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/696,626
Filing Date: October 29, 2003
Appellant(s): RAMACHANDRAN ET AL.

David Rodack
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/20/2008 appealing from the Office action mailed 12/11/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6816718	Yan et al	11-2004
66941129	Peterzell et al	2-2004
6029052	Isberg et al	2-2000

Smith, Steven W. “Introduction to Digital Filters", The Scientist and Engineer's Guide to Digital Processing

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan et al (US Patent No.: 6816718) in view of Isberg et al (US Patent No.: 6029052).
   a. **Claims 1,11,21,**
      i. Yan et al discloses
         - “means for transmitting signals” (Fig. 1, labels 24 and 28)
         - “converting a first signal based on a first system to a first baseband signal” (Fig. 1, input to one of labels 40A-D as the first signal, one of labels 40A-D as the first system and outputs Q-,I- as the first baseband signals, wherein label 42 converts the first signal into baseband signals depending on the mode (Col. 4, lines 40-62))
         - “converting a second signal based on a second system to a second baseband signal” (Fig. 1, input to one of labels 40A-D as the second signal, one of labels 40A-D as the second system and outputs Q+,I+ as the second

baseband signals, wherein label 42 converts the second signal into baseband signals depending on the mode (Col. 4, lines 40-62))

- "processing the first baseband signal using baseband components" (Fig. 1, labels 50A-D,52A-B,56,54A-D,and 30 processes the I+,I-,Q+,Q- signals)
- "processing the second baseband signal using the baseband components" (Fig. 1, labels 50A-D,52A-B,56,54A-D,and 30 processes the I+,I-,Q+,Q- signals)
- "processing the first baseband signal and the second baseband signal comprises filtering" (Fig. 1, labels 50A-D)
- processing the first baseband and second baseband signal comprises "selectively DC-offset correcting the first and second baseband signals" (Fig. 1, label 56, Col. 5, lines 22-42, lines 51-57, Col. 6, lines 4-12 describes a controllable DC-offset correction of the I-,Q- as the first baseband signal and I+,Q+ as the second baseband signal.)
- "wherein selectively DC-offset correcting comprises selecting different DC-offset correcting bandwidths based on which system baseband signal is to be processed" (Col. 5, lines 22-42 discloses "The DC correction circuitry determines the relative DC levels for the differential in-phase and quadrature signals, I+,I-,Q+,Q- and provides corresponding level adjustment outputs to adjust the DC levels of the individual differential in-phase and quadrature signals, I+,I-,Q+,Q-." Since the down converter processes and outputs signals depending on the mode of the incoming

signal (Col. 4, lines 47-52) and DC offset controller determines the relative DC levels of the I+,I-,Q+,Q- signals (Col. 5, lines 22-42), DC offset adjustment applied to the signals would be based on the mode of the signal. By adjusting the DC offset, the DC levels or bandwidths are adjusted.)

ii. Yan et al fails to disclose "selectively filtering the first and second baseband signal, wherein selective filtering comprises selecting different filtering bandwidths".

iii. Isberg et al discloses such a limitation. (Fig. 1-4, Fig. 5, label 42a-b, Col. 3, lines 45-50 discloses "these low pass filters 42a and 42b preferably have programmable bandwidths to enable the receiver to accommodate two bands having different bandwidths." The inputs to the filters are baseband signals as shown in Fig. 2, the output from label 12a and b. (Col. 3, lines 10-13))

iv. It would have been obvious to one skilled in the art at the time of the invention to provide selective filtering as disclosed by Isberg et al in Yan et al's invention so to accommodate for the incoming received signals having different bandwidths.

b. **Claims 2,14,22**, Yan et al discloses the first system and the second system each include at least one of the following systems US cellular, global system for mobile communications, and personal communication system. (Fig. 4, lines 25-26, Fig. 1, labels US cell, EGSM,DCS,PCS.)

c. **Claims 3,23**, Yan et al discloses the processing further includes at least one of filtering (Fig. 1, labels 38A-D), amplifying (Fig. 1, labels 40A-D), providing sampling and correcting for direct current (DC) offset (Fig. 1, label 56).

d. **Claims 4,24**, Yan et al discloses the processing includes processing in at least one of a digital domain and an analog domain (Col. 4, lines 60-62 discloses the baseband processor 30 is generally implemented in one or more digital signal processors (DSPs)" which indicates an analog to digital converter can be found within the digital signal processor so the DSP can operate digitally.).

e. **Claims 5,16,25**, Yan et al discloses the processing includes configuring at least one of the baseband components for a first frequency response characteristic for the first baseband signal and configuring the at least one of the baseband components for a second frequency response characteristic for the second baseband signal" (Yan et al discloses a multi-mode receiver processing modes at different frequencies, wherein each mode inherently has different frequency response characteristics (Fig. 1, labels 40a-d, Col. 4, lines 25-26, Col. 1, lines 14-32)

f. **Claims 6,7,10,15,17,19**, Yan et al discloses a baseband processor comprising DC offset correction (Fig. 1, label 56), filters (Fig. 1, labels 50a-d, wherein filtering can be low pass, all pass, FIR since such filters are well known in the art and can be used to perform the functionality of filtering, wherein the filter is chosen based on the inventor's choice and which would produce the output as

desired by the inventor), amplification (Fig. 1, labels 52a-b), analog to digital converter (Col. 4, lines 60-62 discloses the baseband processor 30 is generally implemented in one or more digital signal processors (DSPs)" which indicates given an analog signal is inputted to the baseband processor, an analog to digital converter can be found within the digital signal processor so the DSP can operate digitally.)

a. **Claims 8,20,27**, Yan et al discloses a plurality of different modes or systems (Fig. 1, labels 40a-d) The system as shown in Fig. 1 would receive plurality of signals, since the receiver continuously receives signals produced from any of the types of systems.

g. **Claim 9,18,26,** Yan et al discloses the baseband processor, label 30, "implemented in one or more digital signal processors", which indicates given an analog signal is inputted to the baseband processor, an analog to digital converter can be found within the digital signal processor so the DSP can operate digitally. Since I+,I-,Q+ and Q- signals are adjusted based on the mode of the received signal, the signals would be sampled at a rate determined by Nyquist matching the mode of the signal.

h. **Claim 12**, Yan et al discloses "a downconverter that is configured to convert a first signal to the first baseband signal and a second signal to the second baseband signal". (Fig. 1, label 42 and Col. 4, lines 40-52)

i. **Claim 13**, Yan et al discloses "a first downconverter and a second downconverter, the first downconverter configured to convert a first signal to the

first baseband signal, the second downconverter configured to convert a second signal to the second baseband signal." (Col. 4, lines 40-62 discloses "The down-conversion circuitry 42 typically uses a one or more mixing frequencies generated by the frequency synthesizer 34 to effect quadrature down conversion." This indicates the down conversion circuitry would comprise at least one down converter for converting the I and Q signals as shown outputted in Fig. 1.)

1st Prior art Rejection for claims 28-33

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 28-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterzell et al (US Patent No.: 6694129) in view of Digital Video Broadcasting (http://www.dvb.org) and further in view of IEEE 802.11a Standards.

   a. **Claim 28**, Peterzell et al discloses a multi-mode receiver processing CDMA signals as well as GPS, GSM, etc. using a common baseband processor. (Fig. 4, label 230 and Col. 7, lines 54-60) Peterzell et al does not disclose processing digital broadcasted signals, but Peterzell et al discloses the system

is compatable to process frequencies within a wireless LAN (802.11). (Col. 3, lines 30-40) Digital broadcasting system was produced in Europe based on OFDM, which is found in 802.11a. (Digital Video Broadcasting discloses in the history OFDM is the element of use and IEEE 802.11a Standards discloses OFDM as its type of modulation used.) Since Peterzell et al's invention can process frequencies within an 802.11 system, digital broadcasting system is based on OFDM and OFDM is found within an 802.11a system, Peterzell et al's invention can also process DBS signals. Furthermore, Peterzell et al discloses a system that can process digital and audio streams. (Col. 7, lines 54-60) Since a digital broadcast system would require a system to process digital signals, Peterzell et al's system can perform such functionalities.

b. **Claims 29 and 31,** Peterzell et al discloses a baseband processor comprising DC cancellation, matched and jammer filtering, which can be low-pass, all-pass, high-pass filters, finite-impulse response filters or smoothing filters, automatic gain controllers (AGC), and decoding into digital data or audio streams. (Col. 7, lines 54-60)

c. **Claim 30**, Regarding the limitation "low-pass filter and the DC-correction element are configured to include switchable bandwidths", Peterzell et al discloses in Fig. 3, labels mode select and 70 selective filtering depending on the mode, wherein each mode would inherently require a different filtering bandwidth. Fig. 3, label I Channel DC offset correction and Q Channel DC offset correction is inputted in to labels 105 and 100, which indicates the

bandwidth or gain is adjusted depending on the labels I and Q Channel DC offset correction. Furthermore, Col. 9, lines 30-35 discloses an adjustable LO 350 depending on the operation of the frequency and Col. 10, lines 41-59 discloses the adjustable LO drive level can change DC offsets, wherein the DC offset must be removed before demodulation. Since the LO is adjustable and causes DC offset, an adjustable DC offset correction would be needed to compensate for the adjustable LO caused offset.

d. **Claim 32**,

i. Peterzell et al discloses

- "at least one of the analog-to-digital, digital-to-analog converter, and the decimation filter" (Col. 7, lines 54-60)
- the components as stated above "is configured to have a first sampling rate for the code-division multiple access system and a second sampling rate for the digital-broadcast system" (Fig. 5, label 305, wherein the interface label 305 determines the type of mode a signal is being received in. Sampling the received signals at different sampling rates would be inherently since different modes would require different sampling rates due to the difference in frequency.)

e. **Claim 33**,

i. Peterzell et al discloses

- "at least one finite-impulse response filter, the DC correction element and the decimiation filter" (Col. 7, lines 54-60 and Fig. 3, label I and Q Channel DC offset correction)
- the components as stated above "is configured to operate at a first frequency response for the code-division multiple access system and a second frequency response for the digital-broadcast system" (Fig. 5, label 305, wherein the interface label 305 determines the type of mode a signal is being received in. Different frequency response would be inherently found for the different modes since each mode differs in frequency.)

2nd Prior art Rejection for claims 28-33

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 28-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan et al (US Patent No.: 6816718) in view of Digital Video Broadcasting (http://www.dvb.org) and further in view of IEEE 802.11a Standards.

   a. **Claim 28**,

      i. Yan et al discloses

- "a code-division multiple access system having a common baseband system" (Col. 1, lines 14-33 discloses CDMA and Fig. 1, labels 50A-D,52A-B,56,54A-D,and 30 processes the I+,I-,Q+,Q- signals shows a common baseband system.)
- a different system "that shares the common baseband system with the code division multiple access system." (Fig. 1, labels 50A-D,52A-B,56,54A-D,and 30 processes the I+,I-,Q+,Q- signals shows a common baseband system, labels 40a-d shows the different types of modes.)

ii. Yan et al fails to disclose the term "a digital broadcasting system".

iii. Yan et al discloses "improved DC offset correction in a radio frequency receiver, which is capable of receiving signals using any number of communication technologies" (Col. 2, lines 37-40) and "Given the lack of standardization and the varying infrastructure for the above systems, mobile terminals, such as mobile telephone, personal digital assistants, wireless modems, and the like, often need to communicate in different bands and operate in different modes, depending on the type of transmission technology used." (Col. 1, lines 34-40) The disclosed section indicates Yan et al's invention can accommodate for "any number of communication technologies" including "wireless modems", wherein 802.11a is a type of "wireless modem".

iv. Digital broadcasting system was produced in Europe based on OFDM, which is found in 802.11a. (Digital Video Broadcasting discloses in the history

OFDM is the element of use and IEEE 802.11a Standards discloses OFDM as its type of modulation used.)

b. **Claims 29,31,32,33,** Yan et al discloses a baseband processor comprising DC offset correction (Fig. 1, label 56), filters (Fig. 1, labels 50a-d, wherein filtering can be low pass, all pass, FIR since such filters are well known in the art and can be used to perform the functionality of filtering, wherein the filter is chosen based on the inventor's choice and which would produce the output as desired by the inventor), amplification (Fig. 1, labels 52a-b), analog to digital converter (Col. 4, lines 60-62 discloses the baseband processor 30 is generally implemented in one or more digital signal processors (DSPs)" which indicates given an analog signal is inputted to the baseband processor, an analog to digital converter can be found within the digital signal processor so the DSP can operate digitally.)

(10) Response to Argument

a. Regarding **claims 1,11,21**, the appellant further contends the limitation "wherein ... selectively DC-offset correcting comprises selecting ... different DC-offset correcting bandwidths based on which system baseband signal is to be processed" is not disclosed by the prior art, Yan.

The examiner respectfully disagrees. Yan discloses "The DC offset correction operates to force the DC levels of the differential in-phase signals I+ and I- to a common level and the DC levels of the differential quadrature

signals Q+ and Q- to a common level to reduce or eliminate distortion caused by having a DC offset between the respective differential signals." (Col. 5, lines 37-42) Depending on the amount of offset found in the input baseband signal as shown in Fig. 1, labels I+, I-, Q+ and Q-, the DC correction signal would apply an amount of adjustment needed to adjust the I and Q signals to a common level. In implementation, it is implied that the DC correction circuitry will perform a selection or choice in order to determine the amount of adjustment, depending on the baseband signal inputted, needed to provide a common level as discussed in the prior art.

The examiner would like to further emphasize, although the examiner uses the term "implied" in the rebuttal above, this does not indicate the prior art does not disclose the recited limitations. Yan discloses "adjusting the Q+, Q- and I+, I- of the DC correction signal to a common level". (Col. 5, lines 37-42) We know that in order to apply DC offset correction, Q+,Q-,I+ and I- must be at different levels. As explained above, in implementation, to adjust such components of the DC correction signal to a common level, an appropriate choice or selection of the amount of adjustment needed must be made in order to bring the I and Q signals to a common level.

Furthermore, Yan discloses applying DC offset correction to baseband signals. (Fig. 1, labels I and Q are baseband signals) Such types of signals are alternating waveforms with 90 degree difference. Since DC correction is applied to such waveforms, the bandwidth or range in which the DC offset is

corrected would depend on the amount of DC offset is found within the signals or waveforms.

b. Regarding **claims 6,7,10,15,17,19**, the examiner has rejected such claims based on the official notice, where such components as low pass, all pass or FIR are well known types of filters is inadequate due to the lack of a secondary reference.

The examiner respectfully disagrees. Filtration components or devices, such as low pass, all pass and FIR filters, are different types of filters. Such types of filters are well known in the art of digital communication. The examiner has provided additional evidence that such filters are well known. Please refer to the reference titled "Introduction to Digital Filters".

Note: The reference provided above is a new reference but is not part of the rejection. The examiner is providing further evidence that such filters recited in the claim are well known and different types of filters.

Furthermore, even assuming, *arguendo*, that such components are not well known, the use of one type of filter as opposed to another does not leave the claim patentable.

c. Regarding **claims 9,18**, the appellant contends "the final office action (page 11) appears to allege inherency of the features of claim 9 (allegedly based on a Nyquist rate determination). ... Appellants maintain the prior traversal of this allegation, the allegation being inadequate to show why the claimed

features are necessarily present in the reference, as Yan contains no discussion of different sampling rates for different signals."

The examiner respectfully disagrees. The limitation under discussion recites "sampling at a first sampling rate for the first baseband signal and a second sampling rate for the second baseband signal." The examiner interpreted this limitation as the first incoming baseband signal is transmitted from one system and requires sampling at a first rate and a second incoming signal is transmitted from another system and requires sampling at a second rate. As per the final office action, Yan et al discloses a plurality of different modes or systems. (Fig. 1, labels 40a-d) The system as shown in Fig. 1 would receive plurality of signals, since the receiver continuously receives signals produced from any of the types of systems.

Yan et al also discloses the baseband processor, label 30, "implemented in one or more digital signal processors", which indicates given an analog signal is inputted to the baseband processor, an analog to digital converter can be found within the digital signal processor so the DSP can operate digitally. Since I+,I-,Q+ and Q- signals are adjusted based on the mode of the received signal (Fig. 1, labels 40a-d), the signals would be sampled at a rate determined by Nyquist matching the mode of the signal. Nyquist is the basic, well known concept within the art used for determining sampling rate. By doing so, the system would not lose information needed for demodulation when transferring from analog to digital.

d. Regarding **claim 28**, the appellant contends the limitation “wherein … selectively DC-offset correcting comprises selecting … different DC-offset correcting bandwidths based on which system baseband signal is to be processed" is not disclosed by the prior art, Peterzell.

The examiner respectfully disagrees. The limitation, under discussion, recites "a direct current (DC)-correction element configured to include switchable bandwidths." The examiner interprets the term “switchable bandwidths” as the bandwidth of the DC offset is switched or adjusted or changed from a current level to a new level. The limitation can also be interpreted as the range of the correction needed to eliminate DC offset is selected. The examiner would like to indicate that 2 rejections have been included for claim 28. Both Peterzell and Yan were used to reject claim 28, wherein both references discloses either one or both of the interpretations above. First, let's discuss the prior art, Peterzell. Peterzell discloses “Additionally, in a direct downconversion receiver, LO leakage that is reflected back into the receiver itself, as well as jammer leakage to the LO port of the I and Q mixers, may be processed by the direct downconversion circuitry. As such, an undesired DC offset voltage may appear at the output of the mixer along with the desired baseband signal, which may also contain baseband spectral components. Accordingly, the DC offset must be removed to ensure that the signal-to-noise ratio is sufficiently high." (Col. 5, lines 42-51) Peterzell disclose the DC offset voltage may appear in the

output of the mixer due to the LO leakage reflected back to the receiver itself and must be removed. In Col. 10, lines 52-55, Peterzell discloses "because the DC output of the LO I and Q channel mixers is related to the LO leakage, varying the LO drive level changes the DC offset. Therefore, the DC offset may need to be removed before baseband signals maybe demodulated. Other mixer performance parameters may also vary as a function of LO drive level, limiting the range of adjustment. A mixer's noise figure and its IIP2 and IIP3 specifications may degrade if the LO drive level is varied over a wide range." This indicate the amount of correction needed for DC offset correction depends on the LO drive level. In order to properly eliminate all DC offset, a selection or choice of the amount or level of adjustment is determined. Peterzell also discloses the LO drive level is varied over a range. To eliminate the DC offset cause by the LO drive level in varied range, the DC offset bandwidth or range must also be selected.

Even assuming, *arguendo*, Peterzell failed to recited the limitation under discussion, a second reference and rejection has been provided for the limitation under discussion in claim 28. Yan discloses in Col. 5, lines 37-42 "The DC offset correction operates to force the DC levels of the differential in-phase signals I+ and I- to a common level and the DC levels of the differential quadrature signals Q+ and Q- to a common level to reduce or eliminate distortion caused by having a DC offset between the respective differential signals." Depending on the amount of offset found in the input

baseband signal as shown in Fig. 1, labels I+, I-, Q+ and Q-, the DC correction signal would apply an amount of adjustment needed to adjust the I and Q signals to a common level. In implementation, it is implied that the DC correction circuitry will perform a selection or choice in order to determine the amount of adjustment, in range as well as in amplitude, depending on the baseband signal inputted, needed to provide a common level as discussed in the prior art.

The examiner would like to further emphasize, although the examiner uses the term "implied" in the rebuttal above, this does not indicate the prior art does not disclose the recited limitations. Yan discloses "adjusting the Q+, Q- and I+, I- of the DC correction signal to a common level". (Col. 5, lines 37-42) We know that in order to apply DC offset correction, Q+,Q-,I+ and I- must be at different levels. As explained above, in implementation, to adjust such components of the DC correction signal to a common level, an appropriate choice or selection of the amount of adjustment needed must be made in order to bring the I and Q signals to a common level. Furthermore, Yan discloses applying DC offset correction to baseband signals. (Fig. 1, labels I and Q are baseband signals) Such types of signals are alternating waveforms with 90 degree difference. Since DC correction is applied to such waveforms, the bandwidth or range in which the DC offset is corrected would depend on the amount of DC offset is found within the signals or waveforms.

e. Regarding **claims 2-5,8,12-14,16,20,22-27,29-33** such claims depend on independent claims 1,11,21 and 28, respectively. Please refer to the rebuttal of claims 1,11,21 and 28, respectively.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Examiner Linda Wong

Conferees:

/David C. Payne/

Supervisory Patent Examiner, Art Unit 2611

/Jason Chan/

Supervisory Patent Examiner, Art Unit 2613

/Linda Wong/

Patent Examiner, Art Unit 2611